

U.S. Patent Application Serial No. 10/009,337
Reply to Office Action dated August 26, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Claims 1-3, 5-7, and 9-11 are amended.

Listing of Claims:

1. (Currently Amended) Device for mode-locking laser, in particular a laser of pulsed type, comprising a resonant cavity [(20)],

- delimited by a first mirror [(1)] and a second mirror [(8)],

- provided with an active laser gain medium [(5)] for amplifying a laser radiation beam at the fundamental frequency [(ω_1)], and

- with a solid non-linear optical means [(10)] which comprises at least said second mirror [(8)], for reversible conversion of the radiation at the fundamental frequency [(ω_1)] into radiation at a harmonic frequency [(ω_2)], said non-linear optical means having a reflection coefficient which increases as the intensity of the radiation at the fundamental frequency increases,

said device further comprising ~~arranged in the resonant cavity (20)~~ a solid intensity limiter [(4)], arranged in the resonant cavity, whose transmission coefficient of the laser radiation passively decreases as the intensity of said radiation increases, wherein ~~characterized in that~~ said intensity limiter [(4)] comprises GaAs, CdSe or InP plate.

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2. (Currently Amended) Device according to claim 1, characterized in that the non-linear optical means $[(10)]$ ~~comprises said second mirror (8) which~~ corresponds to a dichroic mirror and a non-linear crystal $[(7)]$ able to convert the radiation at the fundamental frequency into radiation at a harmonic frequency.

3. (Currently Amended) Device according to claim 1, characterized in that the non-linear optical means $[(10)]$ comprises said second mirror $[(8)]$ which corresponds to a dichroic mirror, a non-linear crystal $[(7)]$ able to convert the radiation at the fundamental frequency into radiation at a harmonic frequency, and at least one component for polarization selection and/or modification.

4. (Previously Presented) Device according to Claim 2, characterized in that said non-linear crystal is a BBO crystal.

5. (Currently Amended) Device according to one of claim 1, characterized in that the non-linear optical means $[(10)]$ comprises only the second mirror $[(8)]$, wherein said second mirror ~~corresponding~~ corresponds to a Fabry-Perot anti-resonant saturable absorber constructed from a superposition of dielectric or metallic semiconductor films.

6. (Currently Amended) Device according to Claim 1, characterized in that the intensity limiter $[(4)]$ and the non-linear optical means $[(10)]$ are placed on either side of the active gain medium $[(5)]$.

7. (Currently Amended) Device according to Claim 1, characterized in that the intensity limiter $[(4)]$ is placed between the non-linear optical means $[(10)]$ and the active gain medium $[(5)]$.

8. (Previously Presented) Device according to Claim 1, characterized in that the active gain medium is an Nd:YAG crystal.

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9. (Currently Amended) Device according to Claim 1, characterized in that the non-linear optical means $[(10)]$ has a reflection coefficient of the radiation at the second harmonic $[(\omega_2)]$ which is greater than the reflection coefficient of the radiation at the fundamental frequency $[(\omega_1)]$.

10. (Currently Amended) Device for mode-locking a laser, in particular a laser of pulsed type, comprising a resonant cavity $[(20)]$,

- delimited by a first mirror $[(1)]$ and a second mirror $[(8)]$,

- provided with an active laser gain medium $[(5)]$ for amplifying a laser radiation beam at the fundamental frequency $[(\omega_1)]$, and

- a solid non-linear optical means $[(10)]$ which comprises at least said second mirror $[(8)]$, for reversible conversion of the radiation at the fundamental frequency $[(\omega_1)]$ into radiation at a harmonic frequency $[(\omega_2)]$, said non-linear optical means $[(10)]$ having a reflection coefficient which increases as the intensity of the radiation at the fundamental frequency increases,

characterized in that said device is provided with an intensity limiter comprising a GaAs, CdSe or InP plate with a transmission coefficient which passively decreases as the intensity of the radiation at the fundamental frequency increases, so as to ensure, in combination with said non-linear optical means $[(10)]$, both a positive feedback and a negative feedback on the quality factor of the resonant cavity $[(20)]$.

11. (Currently Amended) Process for mode-locking a laser, in particular a laser of pulsed type, characterized in that it comprises:

- emitting a laser radiation beam at the fundamental frequency $[(\omega_1)]$ by stimulating an active laser medium $[(5)]$,

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- converting the beam at the fundamental frequency $[(\omega_1)]$ into a beam at a harmonic frequency $[(\omega_2)]$,
- returning the beam at the harmonic frequency $[(\omega_2)]$ to the resonant cavity $[(20)]$,
- re-converting the beam at the harmonic frequency $[(\omega_2)]$ into a beam at the fundamental frequency $[(\omega_1)]$, and
- passively limiting the intensity of the beam at the fundamental frequency $[(\omega_1)]$ inside the resonant cavity $[(20)]$, by means of at least one GaAs, CdSe or InP plate.